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EXAMINER	
TABONE JR, JOHN J	
ART UNIT	**PAPER NUMBER**
2138	

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,975	WEISSINGER, STEVE H.	
	Examiner	Art Unit	
	John J. Tabone, Jr.	2138	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 35-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-24,26,39,40 and 46-48* is/are allowed.

6)☒ Claim(s) *1-16 and 35-38* is/are rejected.

7)☒ Claim(s) *25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-26 and 35-40 have been examined. Claims 27-34 and 41-45 have been cancelled.

Response to Arguments

2. Applicant's arguments, see Remarks, filed 12/27/2005, with respect to objection to claim 15 has been fully considered and are persuasive. The objection of claim 15 has been withdrawn. However, they are not persuasive for claim 25. The arguments presented on page 11, 2nd paragraph uses the claims language of claim 15. The limitations of claim 25 read "the modulo unit divides the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code" where the limitations in independent claim 23 read "a modulo unit to modulo the accumulated-remainder by a generator polynomial to obtain the cyclic redundancy code for the message". The Examiner contends that, broadly interpreted, that the term "divide", in claim 25, is the same as the term "to modulo", in claim 23, since moduloing is the same as two's complement division. Therefore, the objection of 25 is maintained.

3. Applicant's arguments filed 12/27/2005, with respect to independent claims 1, 11 and 35, have been fully considered but they are not persuasive.

As per arguments for independent claims 1, 11 and 35:

In response to the Applicant's arguments on pages 8-9, the Examiner would like to point out the example presented on these pages are not recited in the rejected claims, in particular page 9, paragraph 1. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, The Applicant is also reminded that during patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). See MPEP § 2111. Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the Examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969). Therefore, the Examiner maintains that Christensen teaches the claimed "moduloing each segment by the generator polynomial to obtain a remainder for each of the plurality segment" in that the partial CRC (a remainder) is obtained by multiplying (moduloing) each ATM cell (segment) by the generator polynomial. (See Appendix, col. 6, ll. 52 to col. 8, ll. 34).

It is the Examiner's conclusion that independent claims 1, 11 and 35 are not patentably distinct or non-obvious over the prior arts of record namely, Christensen et al. (US-5951707). Therefore, the rejection is maintained. Based on their dependency on independent claims 1, 11 and 35, claims 2-10, 12-16 and 34-38, respectively, stand rejected.

4. Applicant's arguments, see Remarks, filed 12/27/2005, with respect to rejections to claims 17-24, 26, 39, 40 and 46-48 have been fully considered and are persuasive. The rejections to claims 17-24, 26, 39, 40 and 46-48 have been withdrawn. A Reason for Allowance follows. Please note, claim 25 is objected to and must be overcome or cancelled in response to this office action.

Claim Objections

5. Claim 25 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitations of claim 25 read "the modulo unit divides the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code" where the limitations in independent claim 23 read "a modulo unit to modulo the accumulated-remainder by a generator polynomial to obtain the cyclic redundancy code for the message". The Examiner contends that, broadly interpreted, that the term "divide", in claim 25, is the same as the term "to modulo", in claim 23, since moduloing is the same as two's complement division.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-6, 8, 10, 11-15, and 35-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Christensen et al. (US-5951707), hereinafter Christensen.

Claims 1 and 11:

Christensen teaches a communication system that includes a Transmission Network 10 interconnected by a plurality of ATM Links 14 to respective Data Terminal Equipment 12. (Col. 2, ll. 57-67, col. 3, ll. 1-6).

"separating the message into a plurality of segments;"

Christensen teaches system partitions the ATM packet into ATM cells which are forwarded to the ATM Adapter 22 for further processing. (Col. 3, ll. 25-32).

"moduloing each segment by the generator polynomial to obtain a remainder for each of the plurality segment"

Christensen teaches the processor calculates the packet CRC for a packet from the partial CRCs associated with ATM cells of the packet, where each partial CRC associated with an ATM cell of a packet is multiplied by an appropriate R_i, where R_i represents a fixed remainder. (Col. 2, ll. 9-13).

"multiplying the remainder for each segment by a segment-constant based on the generator polynomial to obtain a plurality of segment-remainders;"

Christensen teaches in order to calculate the CRC for a packet, the partial CRC from the hardware is multiplied by the corresponding fixed remainder in the table and a running sum of all the products of the partial CRCs and fixed remainders are taken.

"accumulating the segment-remainders to obtain an accumulated-remainder;"

Christensen teaches each partial CRC is multiplied by the appropriate R_i and adding the result to the running sum (accumulated-remainder). (Col. 5, ll. 5-21).

"moduloing the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code for the message."

Christensen teaches the remaining sum is then divided by two's complement to find the CRC for the packet. Christensen also teaches a two's complement division (moduloing) of this result yields the packet CRC. (Col. 4, ll. 5-32).

Claim 35:

Christensen teaches a communication system that includes a Transmission Network 10 interconnected by a plurality of ATM Links 14 to respective Data Terminal Equipment 12. (Col. 2, ll. 57-67, col. 3, ll. 1-6).

"separate the message into a plurality of segments;"

Christensen teaches system partitions the ATM packet into ATM cells which are forwarded to the ATM Adapter 22 for further processing. (Col. 3, ll. 25-32).

"modulo each segment by the generator polynomial to obtain a remainder for each of the plurality segment"

Christensen teaches the processor calculates the packet CRC for a packet from the partial CRCs associated with ATM cells of the packet, where each partial CRC associated with an ATM cell of a packet is multiplied by an appropriate R_i, where R_i represents a fixed remainder. (Col. 2, ll. 9-13).

"multiply each segment by a segment-constant based on a generator polynomial to obtain a plurality of segment-remainders;"

Christensen teaches in order to calculate the CRC for a packet, the partial CRC from the hardware is multiplied by the corresponding fixed remainder in the table and a running sum of all the products of the partial CRCs and fixed remainders are taken.

"accumulating the segment-remainders to obtain an accumulated-remainder;"

Christensen teaches each partial CRC is multiplied by the appropriate R_i and adding the result to the running sum (accumulated-remainder). (Col. 5, ll. 5-21).

"modulo the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code for the message."

Christensen teaches the remaining sum is then divided by two's complement to find the CRC for the packet. Christensen also teaches a two's complement division (moduloing) of this result yields the packet CRC. (Col. 4, ll. 5-32).

Claims 2, 12 and 36:

"moduloing the segments by the generator polynomial to obtain the remainder for each segment"

Christensen teaches the processor calculates the packet CRC for a packet from the partial CRCs associated with ATM cells of the packet, where each partial CRC associated with an ATM cell of a packet is multiplied by an appropriate R_i, where R_i represents a fixed remainder. (Col. 2, ll. 9-13).

Claim 3:

"separating the message into three or more segments"

Christensen teaches with respect to the Partial CRC Table (T_B), B represents the packet length and B_i represents cell blocks in the packet. With this notation, 1 represents the first ATM cell in the packet, 2 represents the second, and so on with M representing the last ATM cell in the packet B. Christensen also teaches for each entry in the table, there is a Partial CRC_i, which corresponds to the CRC for the first ATM cell in a packet, partial CRC_2 represents the second, and so forth while partial CRC_M represents the CRC for the last ATM cell in the packet. (Col. 4, ll. 42-51).

Claim 4:

"the cyclic redundancy code is appended to the message and the appended message is transmitted to a receiver"

Christensen teaches the system CPU adds the trailer and a 32-bit Cyclic Redundant Check (CRC32), as described below. The system then partitions the ATM packet into ATM cells which are forwarded to the ATM Adapter 22 for further processing. (Col. 3, ll. 25-32).

Claim 5:

"cyclic redundancy code indicates the existence of an error in the message"

Christensen teaches the calculated Packet CRC is then compared with the received CRC to determine if an error has occurred in the transmission. (Col. 2, ll. 25-26).

Claims 6 and 37:

"integrity of the message is verified if the cyclic redundancy code is zero"

Christensen teaches if Remainder (B/P) is zero, then the frame comprising block B has been received with no apparent errors. (Col. 8, ll. 23-24).

Claim 8:

"moduloing includes dividing by the generator polynomial"

Christensen teaches the solution uses the following properties of remainders for modulo-2 (with no carries) division. For any positive integers A_i where i=1, 2, . . . , m, and P, in equations 1-3. (Col. 7, ll. 50-67, col. 8, ll. 1-15).

Claim 10:

"the segment-constant for each segment is obtained by moduloing the position of the segment in the message by the generator polynomial"

Christensen teaches if a packet was 480 bytes long, when only data bytes are taken into account (10 cells, or 3840 bits), the first partial CRC would be multiplied by the Fixed Remainder of $2^{9(48+8)}$, since there are nine cells to the right of it, each 48 times 8 bits long. This multiplication allows us to account for the position of each cell in the packet. Finally, when the multiplication and sum for every partial CRC is done, we are left with a 64 bit result. A two's complement division of this result yields the packet CRC.

Claim 12:

"the device is a network card"

Christensen teaches the system includes an ATM Network Interface Card (NIC) and a programmed processor. (Col. 2, ll. 3-4).

"the modulo unit includes a plurality of modulo units to modulo the each segment of the message by the generator polynomial to obtain the remainder for each segment"

Christensen teaches the processor calculates the packet CRC for a packet from the partial CRCs associated with ATM cells of the packet, where each partial CRC associated with an ATM cell of a packet is multiplied by an appropriate R_i, where R_i represents a fixed remainder. (Col. 2, ll. 9-13).

Claim 13:

"a memory for storing a plurality of segment-constants"

Christensen teaches as part of the CRC calculation, the system software keeps, among other things, two tables within the system memory. One of the tables is a Partial CRC Table (T_B) shown in FIG. 6B and the other is the Fixed Remainders Table shown in FIG. 6A. (Col. 4, ll. 37-41).

Claim 14:

"the segments constants obtain upon receipt of the message"

Christensen teaches the system includes an ATM Network Interface Card (NIC) and a programmed processor. The processor partitions a packet into ATM cells which are forwarded to the NIC which calculates a CRC for each ATM cell. The ATM cells are transmitted over the link to a destination device and the associated CRCs are returned for further processing by the processor. The processor calculates the packet CRC for a packet from the partial CRCs associated with ATM cells of the packet. In general, each

partial CRC associated with an ATM cell of a packet is multiplied by an appropriate R_i, where R_i represents a fixed remainder. (Col. 2, ll. 3-15).

Claim 15:

"the modulo unit divides the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code"

Christensen teaches the remaining sum is then divided by two's complement to find the CRC for the packet. Christensen also teaches a two's complement division (moduloing) of this result yields the packet CRC. (Col. 4, ll. 5-32).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 7 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christensen et al. (US-5951707), hereinafter Christensen, in view of Cox et al. (US-6438724), hereinafter Cox.

Claims 7 and 38:

Christensen does not explicitly teach "the integrity of the message is invalidated if the cyclic redundancy code is non-zero". However, Christensen does teach the calculated Packet CRC is then compared with the received CRC to determine if an error has occurred in the transmission. (Col. 2, ll. 25-26). Cox teaches the CRC syndromes

calculated on miscorrected data must be non-zero. (Col. 7, ll. 26-31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Christensen's CRC generator 30, which calculates packet CRC to include Cox's CRC syndromes calculation. The artisan would have been motivated to do so because this would enable Christensen's packet CRC to be non-zero in the case of an error.

8. Claims 9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christensen et al. (US-5951707), hereinafter Christensen, in view of Feldmeier, (Fast Software Implementation of Error Detection Codes), hereinafter Feldmeier.

Claims 9 and 16:

Christensen does not explicitly teach "moduloing includes multiplying by a reciprocal-approximator for the generator polynomial". Feldmeier teaches in rewriting the division of equation (4) as multiplication by a reciprocal. (Pg. 644, col. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Christensen's CRC generator 30 to perform reciprocal multiplication in the process of calculating packet CRCs. The artisan would have been motivated to do so because it would enable Christensen to drop the lower order word after the multiplication and as a result CRC only needs to be calculated on the higher order facilitating a faster implementation.

Allowable Subject Matter

Claims 17-24, 26, 39, 40, 46-48 are allowed.

The following is an Examiner's Statement of Reasons for Allowance:

The present invention relates to verifying the integrity of data transmissions, and more particularly, to verifying the integrity of digital data transmissions using cyclic redundancy codes.

The claimed invention as set forth in claim 17 (broadest claim) recites features such as: separating a message into a plurality of segments; multiplying each segment by a segment-constant based on a generator polynomial to obtain a plurality of segment-remainders; accumulating the segment-remainders to obtain an accumulated-remainder; and moduloing the accumulated-remainder by the generator polynomial to obtain the cyclic redundancy code for the message.

The prior arts of record teach multiplying the CRC of an ATM cell by a segment-constant. In other words, the prior arts of record teach multiplying the CRC of each segment by a segment-constant; Christensen et al. (US-5951707) is one example of such prior arts.

The prior arts of record, however, fail to teach, singly or in combination, multiplying the ATM cell by a segment-constant, which relates to the claim limitation "*multiplying each segment by a segment-constant based on a generator polynomial to obtain a plurality of segment-remainders*. As such, modification of the prior art of record to include the claimed *multiplying* step can only be motivated by hindsight reasoning, or by changing the intended use and function of the prior art themselves. Therefore, it is not clear that one of ordinary skill in the art at the time of the invention would have made the necessary modifications to the prior art of record to encompass the *multiplying* step

set forth in the present application. Moreover, none of the prior arts of record, taken either alone or in combination, anticipate nor render obvious the *multiplying* step as set forth in claim 17. Independent claims 23 and 39 recite the same *multiplying* step as claim 17 and are allowable for the same reasons. Hence, claims 17-24, 26, 39, 40 and 46-48 are allowable over the prior arts of record.

The Examiner agrees with the Applicant's arguments with regard to this feature in view of the arts of record; therefor, the Examiner favors the allowance of claims 17-24, 26, 39, 40 and 46-48. Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably accompany the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Tabone, Jr. whose telephone number is (571) 272-3827. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John J. Tabone, Jr. 3/16/06

John J. Tabone, Jr.
Examiner
Art Unit 2138

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